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ABSTRACT

Teacher-student exchanges that occur in architecture studio teaching ("desk crits") were studied as part of a larger ongoing research program. In studio courses, groups of students are assigned to a studio teacher called a critic or crit who oversees the students' work both individually and in groups. From studio observations conducted in four varied U.S. architecture schools, data about desk crits were identified and the observer's notes condensed to yield eight discrete categories of teaching: philosophies/views manifest in teaching, ideas about teaching and learning, student preparation, time, teachers' responses to students, two-way communication, student talk, and teacher guidance based on student work. While all these categories describe important aspects of teacher-student exchanges, the last is the most complex, requiring further analysis and interpretation from such theoretical perspectives as cognitive psychology and adult cognitive development. Examples are provided for each of the eight categories. Included is a review of the contexts for the research such as education in architecture and architecture's critical traditions. Thirty references are cited. (Author/SW)

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AN ONGOING QUALITATIVE STUDY OF ARCHITECTURE STUDIO TEACHING --ANALYZING TEACHER-STUDENT EXCHANGES

Presented at the 1987-1988
Annual Meetings of the
Association for the Study of Higher Education
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Abstract

Part of a larger, ongoing research program examining many aspects of architecture studio teaching, the study reported here focused on the teacher-student exchanges that occur in the studio, called "desk crits." From studio observations conducted in four varied U.S. architecture schools, data about desk crits were identified and the observer's notes condensed to yield eight discrete categories of teaching: philosophies/views manifest in teaching, ideas about teaching and learning, student preparation, time, teachers' responses to students, two-way communication, student talk, and teacher guidance based on student work. While all these categories describe important aspects of teacher-student exchanges, the last is the most complex, requiring further analysis and interpretation from such theoretical perspectives as cognitive psychology and adult cognitive development. These ongoing efforts, and others, are described.

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This paper was presented at the annual meeting of the Association for the Study of Higher Education held at the Sheraton Inner Harbor Hotel in Baltimore, Maryland, November 21-24, 1987. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

Introduction

The present study is part of a long-term program examining several professional fields' views of knowledge and practice, consequent teaching practices, and students' learning. The fields to be studied -- tentatively medicine, architecture, law, business, and journalism -- were chosen because they differ substantially in theory base, practice requirements, and teaching traditions, as has been demonstrated by Stark and Lowther's recent broad studies of professional education (1987). At present the project focuses on architecture for two reasons. First, the epistemological traditions in architecture are diametrically opposed to those in the health sciences, where (of the five fields listed above) the literature base is the most fully developed (see Dinham & Stritter, 1986). And second, architecture serves a useful exemplar for the larger group of design and performance professions.

The aims of the present research on architecture studio teaching are three, best seen as a sequence: (a) to discover what are the essential, recurring elements in studio teaching and consequently (b) to deduce from these the most important themes underlying this pivotal element of architecture education. When these important, fundamental themes have been identified and described, we will (c) then be able to draw parallels between the major themes in architecture studio teaching and the more general current literature on teaching and learning, most of which has heretofore focused on primary and secondary school settings (e.g. Cazden, 1986; Doyle, 1986; Entwistle & Ramsden, 1983; Peterson, 1987; Yinger, 1987).[1]

Because these three aims are not discrete, various aspects of our research are today at various stages in the sequence. For example, the aspect of studio teaching whose exploration has progressed most rapidly is our work on assessment of student performance (Dinham 1986, 1987). Another aspect of this research underway literally as we speak today is my colleague Stefinee Pinnegar's and my exploration of the nature and role of the studio project assignment in studio teaching. The present paper, taking yet another perspective, attempts a summary of our data on teaching behaviors, recapitulating important themes and proposing hypothesized links to the research on teaching literature.

This paper is organized as follows: first, the contexts in which the research occurred are reviewed (including, as a conceptual background, our conclusions from previous work regarding criticism as fundamental in architectural teaching); next our research methods in this ongoing study are described in

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[1]An illustrative exception to this rule would be the current work being done by Patel and by Feltovich in medicine.

some detail; finally our findings about important themes evident in studio teaching are presented and discussed.

Contexts

Research on curriculum, on teaching, and/or on learning occurs inevitably and necessarily in context. Because this study's topic is unfamiliar to many educators, this section describes the context of this research in greater than usual detail. Indeed, this research is imbedded in several contexts, all of which deserve at least cursory mention because of the ever-present likelihood that the research can be influenced by--some would say biased by--the researcher's conceptualizations of these varied contexts. They are:

- the larger research effort, mentioned above
- education in architecture
- the researcher's predilections
  - -about education
  - -about architecture
  - -about research methods
- architecture's critical traditions

Architectural Education

The design fields occupy a particularly problematic position in the campus scene. Caught between the fine arts and the engineering and environmental sciences, architecture believes itself unique in the broad spectrum of university fields. On the one hand the school's graduates move on to very real positions in very real settings; on the other hand, architecture faculties' scholarly work and teaching are driven by the traditions of artistic judgment, the arts of criticism. That criticism is fundamental to architectural thought is indisputable; it follows logically that criticism therefore is fundamental to architectural education as well -- a theme discussed further below.

Architectural curricula vary widely; most are either four, five, or six year programs past the high school diploma; most common a decade ago was the five year program, while today various configurations of six year programs are more the norm (McCommons & Haney, 1982). Architecture is taught in many kinds of schools; most are in, or affiliated with, major colleges and universities. Architectural curricula, like many professional education curricula (Dinham & Stritter, 1986), are composed of three general categories of academic work: basic courses (often in the liberal arts), professional courses dealing with important aspects of professional practice such as building structures or environmental control systems, and "apprenticeship" experiences,

which in architecture occur in the studio. All architectural curricula include at least two and probably more years of instruction in what is known as the "design studio," the focus of the present research.

The term "design studio" refers both to the course and to the room in which students work (Bennett, 1987). The course is the means by which learning from technical and professional courses is combined with instruction in architectural design. The studio is said to be the "place where students learn to make professional judgments," (Beckley, 1984). Design studio courses might account for 25% to 40% of a student's professional curriculum, but in reality, for better or worse (Rapoport, 1984), the design studio is seen as the core of the curriculum, and students spend considerably more time there than is represented on a transcript (Kasparowitz, 1983). Through the architecture curriculum semester after semester, studio project assignments become progressively more complex until the last year--sometimes treated as a graduate year -- when students undertake individual thesis-like projects.

In studio courses the entire year's cohort of students (for example, third year students in Level One Design) are divided into groups of about 15, each group being assigned to a studio teacher called a "critic" or "crit" who oversees the students' work in a particular section of the large room called "the studio" where all students at that level work. One studiomaster coordinates the critics, who may be full time faculty, local architects employed solely for this course, or advanced graduate students. The course meets formally three afternoons per week, although inevitably students are found in the studio many more than 12 hours per week, especially at the end of the term.

Studio assignments, or projects, or "programs," are established usually for an entire year's curriculum by the studio teachers, loosely coordinated by their studiomaster. A 15-week fall semester for fourth-year students might, for example, include an initial one- or two-week project on a fairly circumscribed task, followed by two or three four- to six-week projects of larger scope. A project begins with the studio teachers distributing a one- to five-page description of the project's requirements -- for a downtown hotel, for example, or a residence, or a branch library. Students spend the initial days or weeks of the project's allotted time studying the requirements, the site, and relevant research material; they then begin planning general approaches -- often called the "concept" or the "parti." By the time the assignment is completed, students might have produced a site analysis, a general theme which guides their solution to the design problem, a model of the finished building, and a number of renderings -- for example a floor plan, elevations (exterior depictions), and sections (interior depictions).

Architecture studio teaching can involve a number of varied activities. Before the project begins, the critic is more or less involved in constructing the assignment in consultation with other critics: they may establish the goals, expectations, general procedure, and assessment criteria they will employ for the project. We call this aspect of instruction planning the "design of a project assignment." Just last week we gave a paper describing this form of instructional planning (Pinnegar & Dinham, 1987). Studio teaching also involves implementing the project assignment through many kinds of teacher/student exchanges. During the project, critics meet with students individually and they also meet with them in groups, either for discussion of general points applicable to all students' work, or for interim review of their progress to date. Then, at the end of the project, critics will be involved in final project reviews, both for their own students and for other critics' students. This array of teaching activities is depicted in Illustration A.

Our current research program has concerned teaching activities in the latter two categories: meeting with students individually and in groups, and participating in final reviews (also called "juries"). These contexts are described more fully below:

> The "desk crit" is a brief event occurring repeatedly through an afternoon. Typical the critic moves through the studio on a random or sometimes an informal "appointment" basis, meeting with students at their desks and discussing their thinking, their work, their progress, and their problems with the project assignment. Studio instructors might meet with as few as five or as many as all 15 of the students in "their" studios (a term lingering from the French Beaux Arts atelier system). Altogether a student has the undivided attention of a studio teacher for -- on the average -- 30 minutes per week, probably in two 15-minute segments (Kasparowitz, 1983).
>
> Group meetings with students, held either for general information-dispersal-and-discussion or for interim reviews of student progress, occur less frequently than the traditional educator might imagine. Occasionally -- and more likely at the beginning of a project -- the critic will gather students in the studio or lead them into a nearby room to provide explanations for the assignment, organize students for team efforts, or make observations on problems seen in enough desk crits to suggest that a general problem might exist. Interim reviews occur one to three times during the course of the project -- sometimes by preannouncement and sometimes unannounced. In an interim review the crit calls the students together and takes them

into a room whose walls are lined in tackboard. Students pin up their work-in-progress, and the crit moves from one to the next, commenting on the individual student's work and summarizing the lessons for the entire group to glean from the example at hand. Among architecture schools these sessions vary greatly in their purpose, format, and intensity.

The final review or "jury" is a time-honored tradition in architectural education, an event whose choreography also varies among schools but whose underlying characteristics are remarkably similar from one school to the next. The students' work is displayed for a panel of reviewers (principally local faculty, occasionally supplemented by local practitioners or guest faculty) who hear students in turn give oral introductions and explanations of their thinking and products, and who then provides criticism of both. Usually final reviews are public events: other students are expected to attend and to learn from reviews of their peers' work. The students' critic may be a member of the review panel, or may act as "MC" for the proceedings.[2]

In sum, the teaching context for this project is an extraordinarily complex setting that epitomizes all the complexities of teaching implied by Doyle (1986) and others who have addressed the nature of the teaching setting and teaching task itself. That the setting has a powerful effect on its participants is true of any teaching situation; that the setting's complexity affects research on that teaching is also necessarily true.

The Researcher's Predilections

With exploratory research such as this, the researcher's views are even more inextricably woven into the fabric of the study than often is the case for other, more traditional research approaches. In this study, the researcher found three areas in which personal/professional views could well have influenced the study's conceptualization, design, data assembly and reduction, and interpretation.

Most obviously, this entire research effort rests on a set of beliefs about education. For example, the mere fact that these studies are being pursued at all rests in the assumption that in any educational setting general principles of teaching and learning are manifest. Further, this work rests on the view that both teaching and learning are multidimensional, and

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[2] Research on the jury process has been conducted by Anthony (1987) and Dinham (1986, 1987a), and in the landmark Architectural Education Study (Porter & Kilbridge, 1978).

consequently that they must be studied from multiple perspectives. For example, the processes of education must be examined as well as educational products, and the social and personal aspects of learning must be examined along with cognitive and skill aspects. And last, in this research program we are convinced that teaching and learning are inextricable; if we are interested in teaching we must also examine learning.

Predilections about the subject matter of architecture were also, second, at the root of the project. As data collection progressed, it became clear that the observer could not remain independent of the subject (architectural design) being taught. While the observer's personal interest in architecture was sufficient motivation for long hours of data collection, personal views also came to obstruct the observations. Just as contemporary architectural criticism can rest in any of a variety of viewpoints, so an individual's personal view of architecture inevitably rests in criteria the individual prefers. Historicism, rationalism, functionalism, social policy, and client/user needs are but a few of such criteria (Lewis, 1987). This study found students' studio work appraised against criteria -- both implicit and explicit -- representing many of these critical positions. The investigator deduced that she herself values most highly criteria resting first in a blend of functionalism and user need, with aesthetics a second influence. As a result, and particularly at first, teaching based in other viewpoints were especially difficult to understand (An example appears later in the section of this paper dealing with the Observer). When this bias was recognized, special efforts were taken to make sense of critical comments from other perspectives, and to seek explanation from experts if necessary.

The third set of predilections concerns research methods, and particularly the methodology appropriate for research like this -- complex phenomena being studied for the first time, with intentions to extract themes, form hypotheses, identify trends, suggest extrapolations. In such cases, and particularly within such complicated settings as the architecture studio, in our view, naturalistic paradigms are superior to rationalistic approaches (see for example Guba, 1981; Miles & Huberman, 1984; Smith, 1983). Exploratory research conducted from a naturalistic framework will necessarily employ "qualitative" techniques yielding data that are most likely to be in narrative form.

Teaching as Criticism

In previous papers I have discussed the important role played in architectural thought and (consequently, I have asserted) in architectural education by the concepts and the activities known as "criticism" (Dinham, 1986, 1987a). In brief, I have maintained that, in contrast with the sciences, social sciences and social science-based fields such as education in

which new ideas are explored and knowledge is advanced through approaches generally subsumed by the term "science," or perhaps by activities known by such terms as "scientific research," or more generally "research," in architecture the prevailing epistemology is more accurately termed "criticism." That criticism is the organizing metaphor in the thinking of architecture scholars is manifest in many realms, including not only the nature of scholarly critical writings but also the nature of thought about architectural education in general and about architectural teaching in particular.

These conclusions were long and slow in coming to an educator with traditional (i.e. positivist-based) training in educational psychology and educational research. It is difficult enough for those of us with these traditional origins to accommodate post-positivist viewpoints and their consequences in naturalistic paradigms, strategies like grounded theory construction, and qualitative data analysis. But while many of us have not only crossed that bridge but have become advocates of the "newer" research paradigms, it is yet another step to encounter and hope to work with and understand a body of scholarship in which "research" is less compelling a gateway to new knowledge than is "criticism." Yet it is these very scholars who are designing architectural curricula, arguing over education's proper content and method, and doing the teaching that we study.

These conclusions crystallized through a study of performance assessment in the architecture studio (Dinham, 1987). The study's purpose was "to discover, reveal, unfold important elements in architecture teachers' assessment of student performance, and consequently to deduce from these the important themes underlying this important aspect of teaching." In that study the 23 themes identified in the data were conceptualized in three general categories: the context in which students' work and learning are assessed, observations about teachers and their teaching, and observations about students and their learning. Overriding these 23 themes was, however, the general revelation that assessment of student work is <u>the</u> primary form of instruction. Whether in individual exchanges with students or in group settings where explanations are offered or judgments are made about students' work we found that the milieu was criticism -- whether in the most negative, thoughtless sense of the term or criticism at its best: reflective, analytic, constructive expressions by thoughtful, experienced scholars. "Criticism is teaching is criticism," we concluded.

In the light of this preceding study, then, the present work was undertaken to highlight the pivotal role of the teacher in studio education. Given that the prevailing paradigm is criticism, what more can be revealed about architecture studio teachers and teaching by more closely examining the data for a variety of studio teachers in a variety of schools?

Procedures for the Present Study

Paradigm

To be more specific about this form of naturalistic research, Smith's (1987) conceptualization of qualitative methods provides a useful structure. Smith identifies characteristics of studies approached from a naturalistic viewpoint, i.e. "qualitative studies." The present study is positioned in Smith's typology in the following ways:

- it is context-sensitive

- the data in this instance are etic (i.e. in the researcher's language), not emic

- abstractions emerge from the data--in comparison with studies in which concepts are chosen and observations identified which illustrate those concepts

- the study rests in a realist epistemology (i.e. averring that there is some shared truth in the phenomena observed, which can be identified by consensus), rather than taking a fully relativist position

- of the variety of qualitative approaches, this particular study would be termed "systematic"

Study Delimitation and Design

Studio teaching, as explained above, includes both instructional planning (designing and implementing the project assignment) and student-teacher exchanges, either in the studio (the room itself) or in the other locations where reviews are held (Illustration A).

For the present report, the searchlight has been focused on desk crit teaching. While there is some research on/analysis of architecture studio reviews/juries in the literature (Porter & Kilbridge, 1978; Dinham, 1986; Anthony, 1987), there is absolutely no published research literature on desk crit teaching, a much more private and less easily captured set of events. Desk crits form the core of the educational experience for students (Kasparowitz, 1983; Rapoport, 1984) as well as the bulk of teacher contact hours, and -- until the present study-- desk crit teaching has been entirely unresearched.

This study was designed to build upon the previous study of

performance assessment (Dinham, 1987a). In the former study (in which, it will be remembered, we made not only discoveries about teaching but also conclusions about criticism as the epistemological foundation of teaching), the results on assessment of student work were four general groupings of findings about the teacher and teaching (see Illustration C). The present study was conducted to determine whether these findings about teaching should be augmented with evidence about desk crits to more fully describe the realm of teaching activities/concerns occurring in studio teaching. Illustration B depicts the full domain of student/teacher exchanges, showing the present interest in discovering important themes in desk crit teaching beyond those already identified in previous research on teachers' and reviewers' assessment of student work.

Schools

The data for this study were collected in four U.S. architecture schools during a sixteen-month period. Three of the architecture schools are on the east coast and one is in the southwest. These schools represent a wide variety in program types, from four year to six year curricula, both private and state-supported schools, from residential to urban-center programs.

The schools varied also in physical amenities: they ranged from intimate to fairly formal buildings, and from new and well-maintained to shabby and dirty environments. The schools' administrators differed substantially as well, both in personal style and in the way they arranged the faculty's responsibilities. Probably as a result of the school, environmental, and administrative variance (as well as other more hidden factors), the faculties as entities seemed to this investigator to vary as well, with a range from an intimate few instructors to a faculty over two dozen, with substantial differences in time spent at school, and differing commitments to scholarship and to the overall academic enterprise.

In each school the investigator was introduced by the school's chief administrative officer at a faculty meeting. The administrator or she explained that she was a visiting educational psychologist, was interested in architecture teaching, would be around the school for some months, and would like to talk with faculty members and understand what they do. There was no administrative directive for faculty cooperation; invitations to visit studios came during interviews with individual faculty members about their teaching and their ideas on education. The only studios in which observations were make, then, were those to which the investigator had been invited.

Observations were deliberately varied across curricular levels within schools. This study dealt solely with

undergraduate programs. In all, data were collected in studios ranging from first year design (the assignment was to redesign an urban intersection) to the last undergraduate year (when the project dealt with zoning and marketing as well as designing both a commercial and a residential use for a single in-town site).

Data Collection

The investigator was introduced to students by the teacher, or "critic," who had extended the invitation to observe. Students were gathered into a group, usually at the first day of a new assignment, and the teacher explained (as above for faculty) the investigator's interests. The investigator usually added a few words of explanation including the caveat that no confidences offered by a student would go beyond the investigator.

The primary form of data collection was observation, both of studio student-teacher exchanges and of group meetings. Students and teachers were both interviewed separately to provide background information for interpreting what was observed. Observations were recorded in handwritten notes, initially out of view of students and later--when they were accustomed to being observed--in their presence. During data collection the investigator acted as an onlooker throughout a (usually) several-week period during which students were pursuing a project from initial assignment to final review. Initially a few students would ask what might be recorded "about them: and what the "final report" might be like. These questions were straightforwardly answered with special effort to differentiate between research on architecture teaching/learning and research "on them." In the first few observation days, the observer would move around the studio either with or separately from the critic and ask a few students about their work. Dependably, one or two students would initiate a conversation stemming from the initial introduction, and from that conversation other students would be drawn in.

Early in the process of data collection in a particular studio, the observer would be in close touch with the teacher, asking about this or that student or about the students' progress on the assignment. A particular point was made with each "new" teacher to point out some aspect of their teaching that they might be doing intuitively but which in reality has some solid basis in instructional theory. These conversations seemed especially welcomed.

After these initial stages, the observer could more satisfactorily hover around one or several students, asking about their thinking and their work, and probing students' reflections on architecture school, their studio, their critic, and their lives in general. Critics seemed to want an observer following them around; they varied in the amount of feedback they would

request at the end of the day, the week, or the project. Both students and critics seemed to find the observer fitting reasonably comfortably into the fairly informal studio setting.

In these settings the observer eventually could take notes without being questioned further by student or teacher about "research on them" or "a report." By the end of the several-week project, the observer had become a fixture in the studio; the observer was occasionally sought out for conversation but more often just cordially welcomed by students who would readily explain and then return to their work when she moved on.

Two kinds of notes were taken. The first was a student-by student observation, made as the observer followed the critic through the studio, taking notes on each teaching exchange; in reviews, notes were recorded for each presentation/critique exchange. Here are a few examples:

> Keith [studiomaster] says what have you changed since last time? Student responds explaining problems and thoughts and plans. Keith: there are other ways to do this...
>
> June [studiomaster, another school] meets with student on the first day after a project assignment has been distributed. Student has made an early site visit, and has several site plans, e.g. with vegetation indicated, and a 7" by 10" model with contours at 5' intervals.
>
> June asks what has been your thinking so far?
>
> Jury member Delia [the Level 1 studio coordinator] precisely summarizes jurors' comments, discourses on architecture theory, offers sophisticated criticism and identifies as such, summarizes in positive tone [at end of jurors' comments on student C].

The second was a more general form of note-taking, in which the observer watched an entire afternoon of desk crits, interim reviews, general group meetings, or a jury, taking notes not on separate teaching exchanges but on the general themes, trends, questions being addressed. In this second category the notes are more reflective, although of course they include specifics about teaching exchanges as well. Examples:

> The open jury <u>vs</u> the closed (no audience, even other students) jury would certainly have implications for students' learning from juries.
>
> When Walter [a teacher] says "wants to..." I think he means "you ought to," for example "this wall wants to be over here"

At this school, the design solution's suitability for the site might not be especially important, or might not be as important as it is at other architecture schools.

In the ongoing study, every line of the notes from the four schools had been reviewed for separate "elements," units which even in a different context would still have educational meaning. The examples of student-by-student and more general notes given immediately above are all single elements; the entire data set is composed of 761 such elements. (The reliability of identifying these elements was assessed by a procedure described in another paper [Dinham, 1988]). For the present study, each element with pertinence to desk crit teaching was used; in cases where it might be debated whether an item of information could be thought of as "teaching" or not, the decision was to risk errors of inclusion rather than of exclusion.

Data Reduction Procedure

The available data for this analysis consisted of the original written 761 data elements collected from the four participating architecture schools in the manner previously described. Those elements pertaining to desk crit teaching were identified; they numbered 99, of which 72 were student-by-student elements and 27 were the more general notes, both described above. [Inevitably this form of research also yields field notes on the observer/data collection processes; in this study there were fourteen such notes.]

The 99 desk crit data elements were classified by categorizing them independently of the prior study's findings (the themes in Illustration C). The were initially reviewed to determine the range of their evidence about teaching. Altogether these 99 elements reduced to 53 separate but often related themes about teaching, teachers, students, and learning. Fifty-three being too many themes for meaningful discussion, they were grouped provisionally into six groupings. After the data elements contributing to each grouping were gathered and more closely examined, two categories ("communication" and "philosophy/ideas about teaching/learning") required expansion. Illustration D traces this data reduction procedure.

The final result of data reduction was a set of eight categories of findings about student-teacher exchanges in desk crits. Those eight categories are summarized in Illustration E and elaborated in the following discussion.

Illustrative Examples with Discussion

In the paragraphs below, examples from the data for each of the eight categories of findings give richer coloration to the otherwise sterile topics in Illustration E, and provide a basis for their discussion. (From the examples and discussion it is clear that not all categories are of equal importance; they are nonetheless proposed as separate for the sake of discussion.) The paper concludes with comments on these findings' meaning in the ongoing research study.

Philosophies, Views Manifest in Teaching

Conversational descriptions of architecture schools almost invariably include an attempt to place the school in the realm of the two major architectural traditions, the Beaux Arts and Bauhaus traditions. Before the sabbatical leave during which these data were collected, for example, a dean said about one of the study schools, "that's a very Beaux-Arts school, you know." While it is true that carried to their logical extension these two traditions would be manifest in quite different educational programs, in reality today there is more uniformity among schools than variety. However, in the data on studio teaching offered several poignant examples of basic differences in viewpoint about architecture, design and designing, curricula, and consequently design teaching.

Gary, one of two faculty members in the urban extension office of a major remotely located architecture school, explains the nature of this school. We are chiefly Bauhaus in philosophy, he says, in that we leave students to learn on their own, at their own pace, even in [the remote main campus], where there is a huge program. For example there is no course in "drawing," we emphasize that students need to learn how to find out for oneself, including how to know how to present effectively. Understandably some students finish without having some experiences, he continues, but they should know where to find information.

In this school's studios all 4th and 5th year students are working on individual projects. Most are urban redesign projects, some attempting redesign of interesting areas near the urban office, and some addressing a problem elsewhere, such as in their home town. Because the projects differ markedly, the two studio teachers offer substantially different commentary from one desk crit to another, here addressing problems of pedestrian traffic and elsewhere advising--when asked--about graphic techniques for presenting the design to the jury. There is no allusion to classical forms, as in the two other "more Beaux Arts" studios. Desk crits exemplify the collaborative coaching style explicated by Schon (1987) and alluded to below in the

discussion of "teacher guidance."

In contrast, in the "Beaux Arts school" Mike (all crits' names have been changed) is the studio crit for 15 students working on a project assignment for a monastery to be located in the city near the University. Louise (students' names are also changed) has chosen the sphere as her unifying concept and is struggling to fit the needs of a monastic community into an imaginary sealed sphere. Twenty feet away, Brian has proposed a more conventional parti that has nonetheless given him problems with circulation among buildings. Mike tells both students on different days that the way to approach vexing problems is to "take the extreme stance" and then solve the problem presented. In this school there is significantly less concern for the realities of site and user/client needs -- as exemplified in the sphere parti. Lest we conclude that these are merely Mike's criteria, we find that June, the studiomaster working with her students across the room from Mike, speaks metaphorically and encourages students to explore classical solutions to similar problems. At this school students like Louise earn A's with solutions bearing no pertinence to the realities of users' (in this case a religious order's) needs; the focus is instead on logical extrapolation of the parti into design decisions.

Ideas about Teaching and Learning

Students and teachers have varied and firmly held ideas on what teaching and learning are; these ideas are expressed both in words and in their participation before, during, and after desk crits in the studio.

In the monastery project school, one of the more mature students gives a comparison of June and Mike, the crits mentioned above. June is precise, she says, hitting you over the head to do things right; she is an excellent crit, she says, and she [student] was glad June was her teacher last semester. Mike, in contrast, is more lyrical, expressive, artistic; he is more of a communicator, she observes. In explaining about teaching, she says that the purpose of learning is "learning how to think."

Tom (another studio teacher at the same school) explains that it takes time for students to assimilate what they've dealt with in the desk crit just observed. Indeed, students reported that they were pondering (they were also tapping, frowning, staring), considering his advice and trying to incorporate it. They were trying also, they said, to decide about accepting/rejecting his advice "because it's just his opinion, and all subjective," they say.

At another school, students report that teachers also sometimes hold the "just two opinions" view. In an informal

conversation in the studio, before desk crits begin, a student explains that his teacher last semester, Joseph, is very vague; he teaches (says the student) that architectural design is a matter of aesthetic judgment and neither the design nor the teaching of design can be methodically approached. The student explains that for first semester Level I this is not sufficient because it's not structured enough, and students haven't had experience or criteria enough. On a weekend day in the same studio, students expand on the Level I teachers: these two are the best, through two others who are last, one being Joseph and the other being dubbed "Mr. Autocrat."

In addition to their views about what teaching and learning are, both students and teachers have rich perceptions about how to teach, and to learn. The perceptions are fraught with conflicts; for example while students need to be able to extend their initial concept into a fully developed design, this must occur in an orderly fashion; Sarah (a student working on the monastery project) explains to me that when she is at the initial states of developing a project she keeps ideas about details in a notebook so she won't be mired in detail but will still have a record of her ideas when the time is right.

Among the most important themes in defining teaching and learning is studio teachers' concern that students not become too narrow too fast, that they keep options open and think broadly for as long as possible in developing a design. This too is a theme fraught with conflicts, for just as many teachers will nudge students toward closure as will try to force students to resist premature closure. The latter is the more problematic, however because students tend to seek certainty over ambiguity, even productive ambiguity. Teachers' efforts to keep students flexible is so important that it has been discussed in greater detail elsewhere (Dinham, 1987b).

Despite the common perception that desk crit teaching consists of reacting spontaneously to each student's work as it is encountered through the afternoon, these data showed that teachers often planned thoughtfully for the group as a whole or for individual students. Matt found himself repeating himself with each student as he progressed through the afternoon; after about 45 minutes of this repetition he gathered them around and herded them to a nearby classroom where he put several unvisited students' work on the walls and extracted from them the general messages he wanted all students to consider.

Teachers design their instruction for individual students in almost imperceptible ways. Mike explains that he has permitted Louise to do the spherical resolution of the monastery project because, as an accelerated student studying architecture after another bachelor's degree, she has not had as much design instruction as have the others, and he wants her to experience

the full challenge of establishing an extreme ("take an extreme stance") parti and extrapolating it to a full design. At the Bauhaus'ian school, Gary departs from the school's usual focus on realistic designs and allows a student from a rigidly functional background to design an imaginary "house for Perry Mason," basing his justification on the same "parti-->design" rationale. His colleague at the urban architecture center explains "we teach architecture with every student's project," and indeed the same principles appear in most desk crits although the projects are diverse.

In a side conversation Mike worries aloud about his relationship with Alice, one of his students; he says he is uncomfortable about his work with the student, and is not sure what is wrong. When he is with Alice, he is particularly attentive to how they communicate; he is frustrated to think that he cannot get through and asks the visitor's observation about what might be wrong. In another studio, Matt worries about the work being done by shy LiAn -- or rather the work not being done. In contrast to his usual technique toward the end of a project, when he wanders the studio and remains available but lets students work at their own pace, with LiAn Matt is very directive. Because she is stuck, he tells her exactly where he believes she should begin and how to "get unstuck." This turns out to be particularly effective advice, both because her cultural background leads her to respond promptly to directives from authority figures, and also because she is troubled with her prospects for success in this field and needs tangible experience to see whether she wants to stay or leave.

Student Preparation

Students' thinking, planning and work before and after desk crits provide the context in which crit teaching is embedded. One of Matt's students explains his strategy. He starts early in the project, he says, rather than waiting around for inspiration the way many other students do. That way when "stuck" points come, there's time to get by them. Even when he's uninspired, he finds, he can keep plugging away at elements of it -- try to stay busy chipping away at it. Through this and working with the teacher, progress comes and insights about possible solutions become clear. He finds that he can go from points A to B to C, he says, then Matt comes along and takes him to D, and he can go on to E.

Another student at another school also begins early on the project assignment. By the time of his first desk crit, he has visited the nearby site and made a 5' by 7' rough topographic model of it, thought about various options for a parti, and considered some design consequences of the metaphor ("water") he is considering adopting for the monastery. In contrast, Cathy calls across the room to another student to say she's looking for

inspiration. She is leafing through a book looking at classical architectural forms, and fussing and staring. When June arrives for the crit, she explains that the general concept underlying her work on the monastery will be the "search for god," to begin with a hard line of buildings on the east side of the site for protection from the nearby worldly realities--a beginning June says is a strong concept that now requires some hard work.

Time

For both students and teachers, time is at once important and unimportant. Most events in the world of studio instruction begin later than the announced hour; 2:00 juries begin at 2:20, for example, or the crit arrives from lunch ten minutes late at 1:10 to find students struggling in bearing work from home. A speaker has come to recruit students for graduate work at a midwestern university; when his presentation interrupts the afternoon's work for longer than his allocated time, some students are diverted but others say they resent the loss of time.

June worries about students' making use of her time; she wanted each student to sign up to see her either Monday or today (Wednesday) and she has seen only four of the fifteen -- the others haven't signed up and she knows they need desk crits whether they realize it or not. Matt's student, who uses the desk crit to move from point C to D so he can go on to E, emphasized the importance of studio time in his explanation. He has a heavy course load and works part time, and cannot afford to waste studio time in the ways that are traditional for architecture students.

The use of time in the teaching studio has worried several thoughtful writers on studio instruction. In their incisive debate about studio teaching, both Rapoport (1984) and Beckley (1984) mentioned the importance of studio time, as did Hurtt (1985) in his rejoinder on their papers.

Teacher Response to Student(s)

In the findings of the earlier study on assessment of students' performance (Illustration C), several themes in the "evaluation" category emerged, namely, "evaluating more/less able students," "evaluating better/weaker work," and "evaluating own students vs others'." Of these three themes, the first two reappeared in the present findings about teachers who were working solely with their "own" students. The easy, comfortable rapport observed in the earlier study with students known to be "better" students appeared in lighthearted banter at the beginning of several crit sessions and in Louise's case in several triumphant handshakes through a session with Mike in which they agreed on the direction and progress her spherical

monastery solution was showing.

With less able students and/or with weaker work, some crits showed no negativism but also no humor; in one instance I learned later that a student Mike had visited earlier was provisionally graded as D+; there was no sign in Mike's demeanor that the work was particularly weak or the student less able, although in their discussion Mike had made a number of strong suggestions about revamping the design.

Other crits handle weaker work in other ways. On a fourth year hotel project for an urban site, Tom "becomes impassioned about poor design....The student is not participating in the discussion except to agree or say but I thought you'd said it's OK. Tom says every bloody hotel looks like this. Why should I hire you? I want you to be prepared to answer that." Several days later Tom uses the phrase "I want you to think about that" when he means the work is unacceptable and should be changed, preferably in directions he has in mind but has not explained. In instances where the work is palpably weaker, there is a higher percentage of teacher talk in Tom's desk crits.

June, normally an articulate and insightful teacher, has problems when she encounters weak work. Normally she wants students to see their own weaknesses without her assistance. When she is in reviews she often turns to other students to enlist their advice to the transgressing student, but in individual desk crits she has nobody to rely upon but herself. In these cases she is uncharacteristically oblique (this is the teacher Louise told us is "hard-hitting"), asking such things as "what are the challenges [read 'problems'] you are facing here?"

In addition to the themes that had emerged in the earlier study of student assessment, in this study several themes about the teachers' apparent feelings emerged as well. Mike's concern that he feels uncomfortable with his student Alice has already been mentioned. Two days after confiding that he was troubled in dealing with this student, Mike and she had another crit in which she was considerably further along (in the directions he had advised); the tone was easier, and Mike later said he felt better about the situation. A note from this episode asks whether a teacher feels like a better teacher when the student's work is better work, and/or when the teacher simply likes the student. Alternatively, whether the teacher "feels like a good teacher" may be curvilinearly related to the quality of the student's work: with particularly weak work and particularly outstanding work the teacher might feel frustrated or unnecessary.

Two-way Communication

That teaching occurs in the context of communication is hardly news. The logistics of communication often vex new

teachers; they must learn to use such logistics as timing, silences, and "wait time" constructively. With Peter, Mike questions by making statements, and "sometimes when Mike asks a question in the form of a statement, Peter agrees, then hesitates and it takes a couple of double takes to comprehend [Mike's point]". Teachers often cannot be sure what is happening during silence; for example after this exchange Mike "reworks Peter's design. After this, which Peter observes rather than participating in, there is a long thoughtful silence from both."

The substance of the two-way communication is of course the greater interest in teaching. Both students and teachers will occasionally check to see if they're being clear. At the beginning of a crit Bryce explains his recent progress in great detail, and then goes into his perception of his current problems, fading at the end with pauses and then "I'm not sure I'm being at all clear here..." although of course just the fact that he is aware of how he is communicating signals greater than the usual student clarity. A teacher's check on whether he is being clear can be laden with other messages; perhaps the teacher actually believes he hasn't made the point, or feels the point needs to be emphasized, or is trying to elicit a reaction from an unresponsive student. Both Jon and Gary, meeting together with a master's student, say in the crit "I don't know if I'm being clear here, but..." and later make perfectly clear to the visitor that the student's work is both uninspired and unsatisfactory.

One of the most difficult communication problems in desk crit teaching occurs when a difficult idea is to be conveyed and the student seems not to grasp the point. Alfred struggles to explain to a student that he must have reasons for the design decisions he makes, and that those reasons should be manifest in the design itself. He says "your building is lumpy" (i.e. many rooms have three exterior walls); "what if your client said you must streamline it to save money, how would you feel about that?" the student says that could be done; Alfred says "that doesn't horrify you? would it be OK to change it?" and the student continues to agree that he would comply. Alfred continues the exchange for a few more turns but then moves to other topics; later he explains that he was trying to force the student to understand the consequences of his design decisions but didn't feel he ever made the point.

Another extremely difficult communication problem occurs when the two -- teacher and student -- are speaking at different points on a continuum. Three examples demonstrate (1) a teacher discussing concept and the student discussing details, (2) a teacher discussing thinking and the student responding with design detail, and conversely (3) a teacher discussing design details when the student has asked questions about his thinking.

(1) Early in the project, discussing the student's main concept (a natural, organic, informal approach), June asks "what are the challenges you are facing here?" and the student responds not on the conceptual level of her question but instead says "paths."

(2) In the "lumpy building" conversation, Alfred asks "how would you feel" about the client's request for a streamlined design, and the student replies with information about the walls he would move, how easy it would be, and whether it could be done. After the "doesn't that horrify you?" question, the student responds with further detail about what he'd do.

(3) With Tan's initial explanation Mike seems bored; his eyes wander and he doesn't seem to be listening, except when the student describes June's reaction to his work last Friday. Tan discusses what he is thinking, and how his thinking led him to the design before them; Mike responds with what to do next. Tan responds with more about his thinking; Mike responds with more about what to do, without amplification on how to think about it. (Tan's grade at this point is today a D-, according to Mike.)

Student Talk

Student talking in desk crits became a separate category from the general nature of the two-way communication when the data about student talk were reviewed in detail. While some students talk a great deal in explaining their thinking and planning to the teacher, others just move aside when s/he comes along and lets the teacher look without commenting. Students swiftly come to understand whether the teacher is interested in hearing about the processes either of thinking and planning or of confronting and resolving design problems in the assignment. In the Architecture Education Study, a juror expresses one viewpoint emphatically:

> The only reason why I'm here is to talk about whatever this thing triggers in my mind. And I am not here to listen to endless explanations of students who tell me what is on their minds. It's as simple as that .... (Porter & Kilbridge, 1978, I, p. 400)

Admittedly this outburst came in the context of a jury rather than a desk crit; it followed a plea by a studio teacher whose students' work had not been receiving the jury's attention. This same attitude is reflected in some studio teachers' communications, nonetheless, and the students learn their place quickly.

This attitude is in the minority, however; in most instances students know that they should talk about their thinking process, the concepts underlying their design, how the concept led to the design, the details in their design, and the directions they plan to go.

The way students talk in response to teachers' talk presents another set of expectations and communication. In some instances there is a distinct collaborative tone to the discussion; both teacher and student are involved in attacking the design problems the student faces, and the talk is a mutual exchange. Schon (1987) has elaborated this kind of communication (see the following section) in his discussions of "joint experimentation" in teaching. In other situations, students' responses are limited to agreement, or "hmmm" or other noncommittal responses which could signify any number of messages, from "I don't understand" to "Whatever he says, be polite and then do what you prefer."

Teacher Guidance Based on Student Work

Studio teachers depict themselves as guides for student work, perhaps more experienced than students, perhaps as mentors, parent-figures, or guides, perhaps as realists who must let students know "how it is" in the "outside world." When studio teachers describe what they do, the preceding seven aspects of desk crit teaching might or might not be mentioned, but the nature of teachers' guidance in students' thinking and designing always predominates. When teachers talk about studio teaching over beer on Friday night they emphasize how they respond to and steer students and their work.

Explaining studio teaching to a group of students once, I used the metaphor of the sheep dog who knows where his unpredictable and highly individualistic charges are to go, and who selects just the right strategy to get the group in general, and each student in particular, to the goal -- sometimes nipping, sometimes using circling runs, sometimes watching closely and other times lying low, sometimes specifically mandating every hard-won step of the way.

Teachers guide students in differing ways. Three explanations for the variance in teacher guidance could be posed: first, that teachers prefer different strategies for teaching; second, that different students require different strategies; and third, that certain situations require different strategies, as Schon (1987) has said. The data in this study are not sufficiently detailed to distinguish among these explanations, but they do give evidence of two distinct patterns in desk crit teaching.

The two patterns differ in this way. As a basis, of course,

teachers need something to spring from in their teaching--students' thinking, a preliminary site analysis, ideas on design strategy, sketches of plans or sections. For some teachers (or for some students or in some situations), it may be possible to elaborate directly from students' work and accomplish all that they want to accomplish. For other teachers (students, situations), the teacher may use the student's work or thinking as a base, but may then offer his/her own alternatives and ways of approaching the problem, and only then rest the discussion on the redefined problem.

Elaboration.-- While both styles involve basing the desk crit on student work, the "elaboration" approach uses the student's work as presented to stimulate instruction. At an early stage in the monastery project, June comes to Carl's desk, which is "covered with sketches of his various analyses, e.g. entries, water, etc. June says what have you decided are the advantages and disadvantages of each of these analyses? ... It's great that you are doing this methodically....Now, where are you going next? Student says working with contours. June begins analyzing via a flow diagram Carl has used to list all the important elements of the site and the program. June suggests grouping these elements to fewer than the present 15 or so. That's one way to handle this, she says, but you also need an organizing theme. You need [further] to deal with issues like procession, seclusion, etc." Moving on to McCullough, who is quite far along with a multicolored site plan with functions in each area, she engages the student in extensive discussion, suggesting next steps -- contours, pathways. Next to Sally, whose "concept" is the metaphor of the seasons to symbolize the monks' progress through life. June works through the design implications of this concept with the student."

In an innovative single-room project with Level I (first year design) students, Matt had met last time with the students in an informal group review of early progress. Today Matt is "looking at (1) whatever the student is doing as the solution chosen, and is resolving design questions with the students--proportion of height to room size, length to width, turning corners, etc, and (2) how students will represent the room in their assigned up-axonometric renderings. He asks one student How're you doing? Student replies both about the design solution and about the vexing up-axon. Matt focuses on how did you get from here to here, i.e. summarizes with student the extrapolation of his thinking from start to today."

Twelve days later, on a Wednesday, the students are nearing the end of the project; the jury is Friday. "Matt is circulating, tells me that nobody wants to talk to him except for advice on model construction and presentation (e.g. which walls to remove). He appears and reappears, indicating curiosity about and interest in each student, and his availability. The tone is all collegial

now."

This collegial tone characterizes the kind of teaching Schon (1987) calls "joint experimentation." The teacher and student are on the same side of the drawing board and are working together on the student's thinking and work. The teacher explores students' thinking, elicits design consequences of the parti, make suggestions based on student descriptions of their thought process and their progress as visible on the board. This is not to say that they avoid evaluative judgments; they express their approval or disapproval of the thinking and work, but the tone is cooperative, participatory rather than directive.

Redefinition.-- In some instances (certain teachers, or students, or situations) the teacher must redefine the student's thinking or work before the discussion can be fruitful. At times the teacher might simply redesign whatever the student has produced, with or without explanations or questions about motivations, thinking, or problem resolution. Students accept the redesigning and, after the teacher leaves, ponder how to incorporate the new ideas into their own.

More often when teachers redirect students, the teacher is trying to get the student to change, perhaps to analyze more conceptually, to be more specific, to adopt the teacher's view of the parti's design consequences, to move next in the directions the teacher knows would be best. Tom, for example, looking for the first time at a student's initial thinking about the urban hotel, "ponders what he sees and pinpoints the problems in the student's work. He redraws the design on tracing paper and interprets through that. There is little positive comment, and a higher percent of teacher talk than student."

Mike's teaching style with Bryce is a question-and-answer attempt to move Bryce through the design consequences of his concept. Bryce has offered a rambling explanation of his concept and Mike pushes him with comments such as "this is a real central question--how are you handling it?" and "what other options do you have for this?" "what else?" The timing of his questions with Bryce suggests that he has in mind certain correct answers and when they are not heard Mike is justified in going on to sketch over Bryce's work, narrating as he does so. "So, if you decide to do it this way, then the solution would be ... this solves some problems but not all. Maybe you could ... You could do this, or else do that." Later when they are discussing more specific areas of the design, Mike is similarly directive: "That's an interesting situation to work out in pure architectural terms, he says (sketching), for example this part could be even more strongly outside the wall, you could do this over here...."

Redirective teaching echoes Schon's "Follow Me!" category,

in which the "dominant pattern is demonstration and imitation" (1987, p. 214). It is necessary to redirect when the conceptions the teacher has in mind are not available to the less experienced student, or when the ways of working the teacher wants students to develop are beyond their realm of imagination. Redirection seems to be used also when the teacher prefers the efficiency of leading rather than the vagueness of sheep-dog style herding. As is mentioned below, these two strategies require considerably more analysis than this study has made possible.

Provisional Conclusions and Comment

The "map" of architecture teaching displayed in Illustration A is being explored through a group of studies of which this is but one. Studio architecture instructional planning requires substantially more exploration (in addition to our current work) along the lines of the current research on instructional planning for elementary and secondary school education. For example, Leinhardt and Greeno's (1986) work characterizing teaching as a complex cognitive skill posits two fundamental systems of teacher knowledge: lesson structure and subject matter (the first being the knowledge required to construct and conduct a lesson), a model exactly suitable for analyzing design teaching. Indeed, the entire body of current research on teacher thinking (e.g. Clark & Peterson, 1986; Yinger, in press) also includes a significant component on teacher planning. This rich literature must be applied to studio teaching and the proposed links explored in future studies.

Research on student-teacher exchanges, described in the earlier paper and this discussion, has been more comprehensive. However even this more comprehensive research is -- as advertised in this paper's title -- ongoing. Two aspects of this ongoing stream continue to flow: merging these two studies' findings, and exploring these findings' pertinence to the current literature on teaching -- particularly the literature from cognitive psychology in general and teacher thinking in particular.

Merging these two studies' findings is an exciting prospect, since for architecture teachers and students alike, studio teaching exchanges and reviews/juries are not separate but two parts of the whole educational experience. From the previous study and this one, our provisional merging of findings would yield four aggregated clusters of ideas about teaching and learning in the architecture studio:

> Philosophies, ideas, and principles about architecture, design, criticism (discussed above), and consequently what architecture teaching is/should be. What learning is/should be, and what the teacher's role(s) might be.

The nature of teachers' thought and action, including most importantly the nature of their guidance of students' thinking and work, their criteria for assessing and guiding students, and their use of various mechanisms in teaching such as arranging the logistics of setting and groups, use of time, setting of physical context.

Interactions of teachers with students, including teacher talk, teacher sketching/revision, teachers' response to students (whether judgment or feelings), and myriad aspects of two-way communication including conveying negative ideas, clarity of messages, and whether teacher and student understand the other.

Student thought and action, including student thinking with and without teacher present, response to teacher ideas and directives, student presentation of ideas and work whether oral or representational, whether at desk or in review.

Linking these clusters of ideas about studio teaching to the extant and rapidly developing research on teaching literature is another exciting prospect. The first ("philosophy...") category typifies the discussions found most often in the Journal of Architectural Education as well as in other scholarly journals in architecture. These discussions focus on the traditional and now-classical Beaux Arts and Bauhaus conceptions of architecture and of design (and hence architectural education) merged with reflective meditations on their consequences in curricula and studio teaching. The research of such thinkers as Doyle (1986) on curriculum and others on teachers' representations of their content areas can fruitfully be applied to this cluster of findings.

The nature of teachers' thought and action is perhaps the most complex for research on studio teachers. Of the eight categories revealed in the present study, the findings about teacher elaboration vs teacher redefinition may be the most exciting, as they touch on many basic chords of educational principle and practice. Schon's (1987) distinction between "Joint Experimentation" and "Follow Me!" strategies is but one of the many courses of research and thinking that pertain to studio teaching. Other courses of work are principally those in teacher thinking (e.g. Clark & Peterson, 1986; Peterson, 1987; Yinger, 1986; Yinger, in press).

Interaction between student and teacher is a third fruitful area for study. Not only is the nature of teacher and student discourse itself interesting, but the complexities of talk in interaction with graphic representation has had no exploration whatsoever. Anthony (1987) has attempted to study student-

teacher interaction in juries; her paper illustrates the complexities posed by multiple perspectives on teacher-student interactions, in this case in studio juries. Even more complicated would be research on teacher and student thinking during the communications at "cross purposes," e.g. when one is thinking of detail and the other of concept, or one wants to discuss thinking while the other discusses representation. Unfortunately, the methodological obstacles to such studies are formidable (Yinger, in press).

Studying student thought and action would itself be a new and fruitful research stream that could illuminate architecture's understanding of studio teaching and learning. The extensive body of literature on student learning has only recently dealt with the complexities of cognitive functioning (Shuell, 1986) that we see in the studio. The current, alternative conceptions of learning and memory (e.g. Norman, 1982) propose competing explanations for the short term, long term, and applied learning that architecture studio teachers hope to influence in their daily work with students.

The extensive research possibilities posed by just these four clusters of findings challenge and provoke those of us interested in the larger questions of professional education. How does the apprenticeship component of a professional curriculum transform novices into professionals? How does the teacher -- the pediatrician, the piano coach, the design studio teacher -- design the setting and the teaching so that students will learn? The present research has attacked a small section of this large and promising research territory; the uncharted territory is yet to be explored.

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Illustration A

A Map of Architecture Studio Instruction

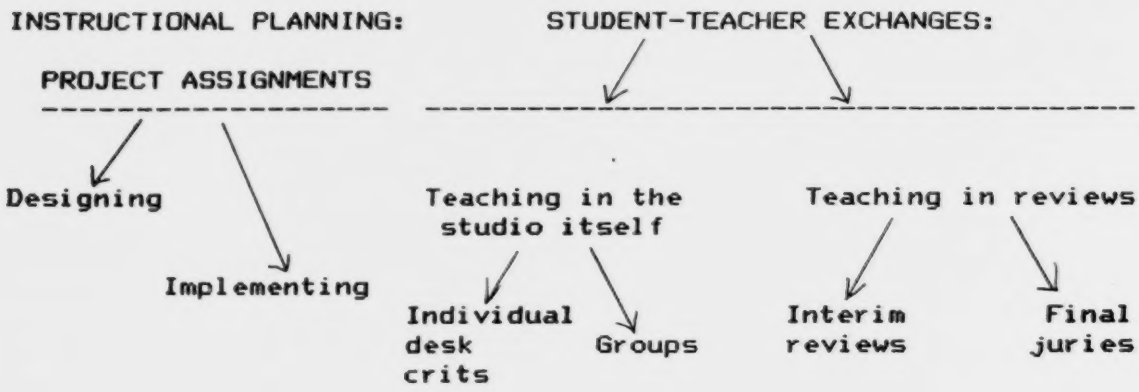

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Illustration B

Comparing Previous and Current Studies' Interest in Teaching through Desk Crits and Other Exchanges

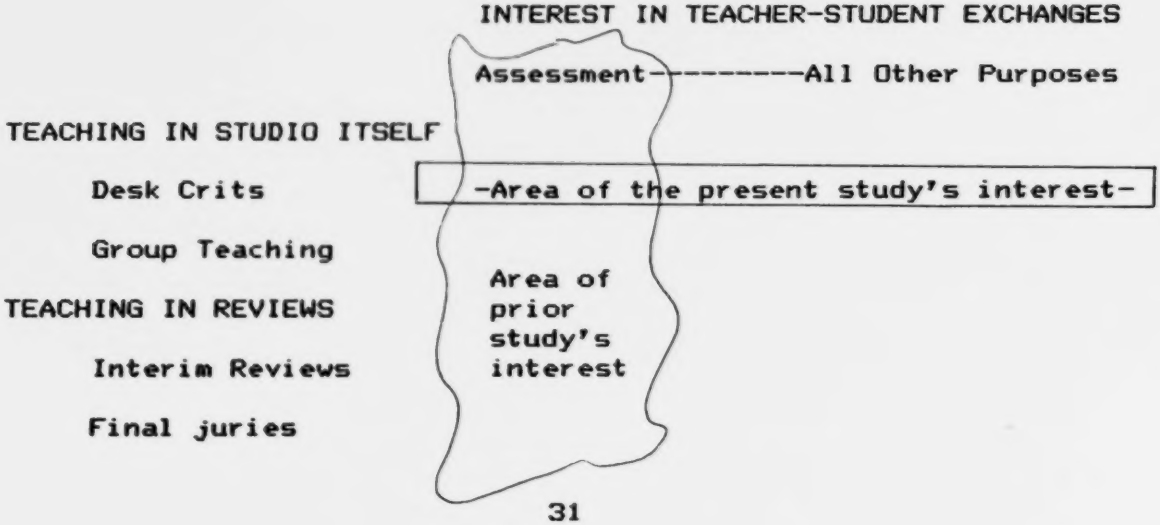

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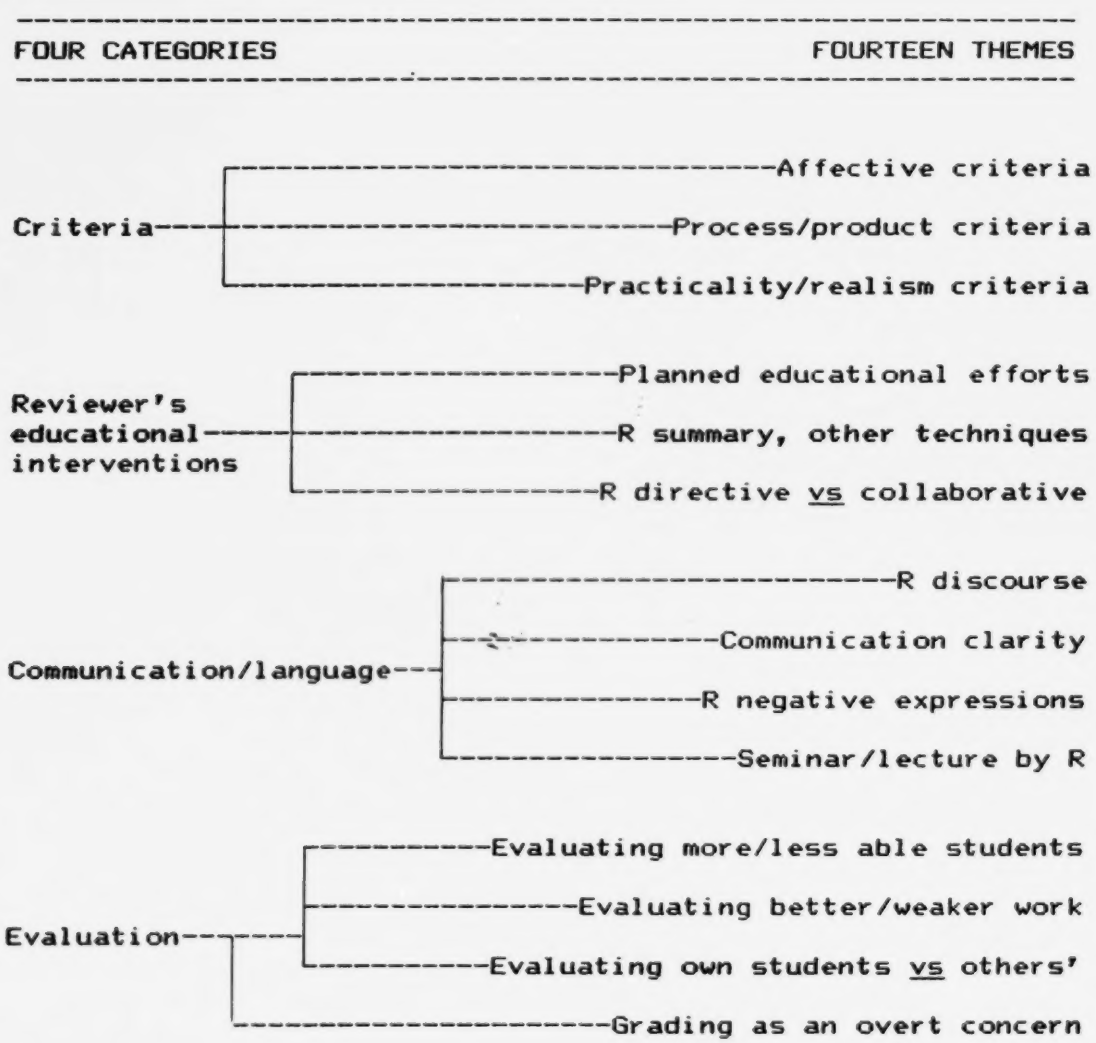
Illustration C

Dendogram of Teacher/Reviewer Themes
in Four Categories
From "Performance Assessment in Architecture"
(Dinham, 1987a)



NB: The abbreviation R designates the person who acts as the Teacher or as the Reviewer of student work

Illustration D

Data Reduction Summary

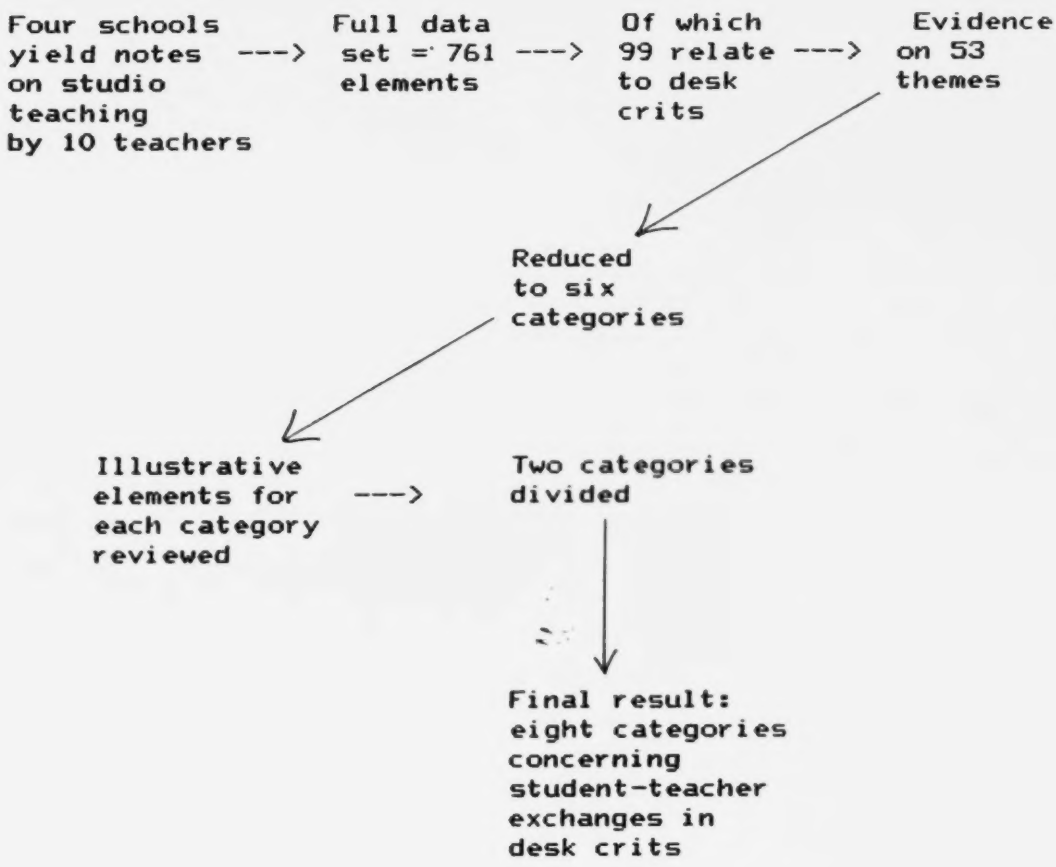
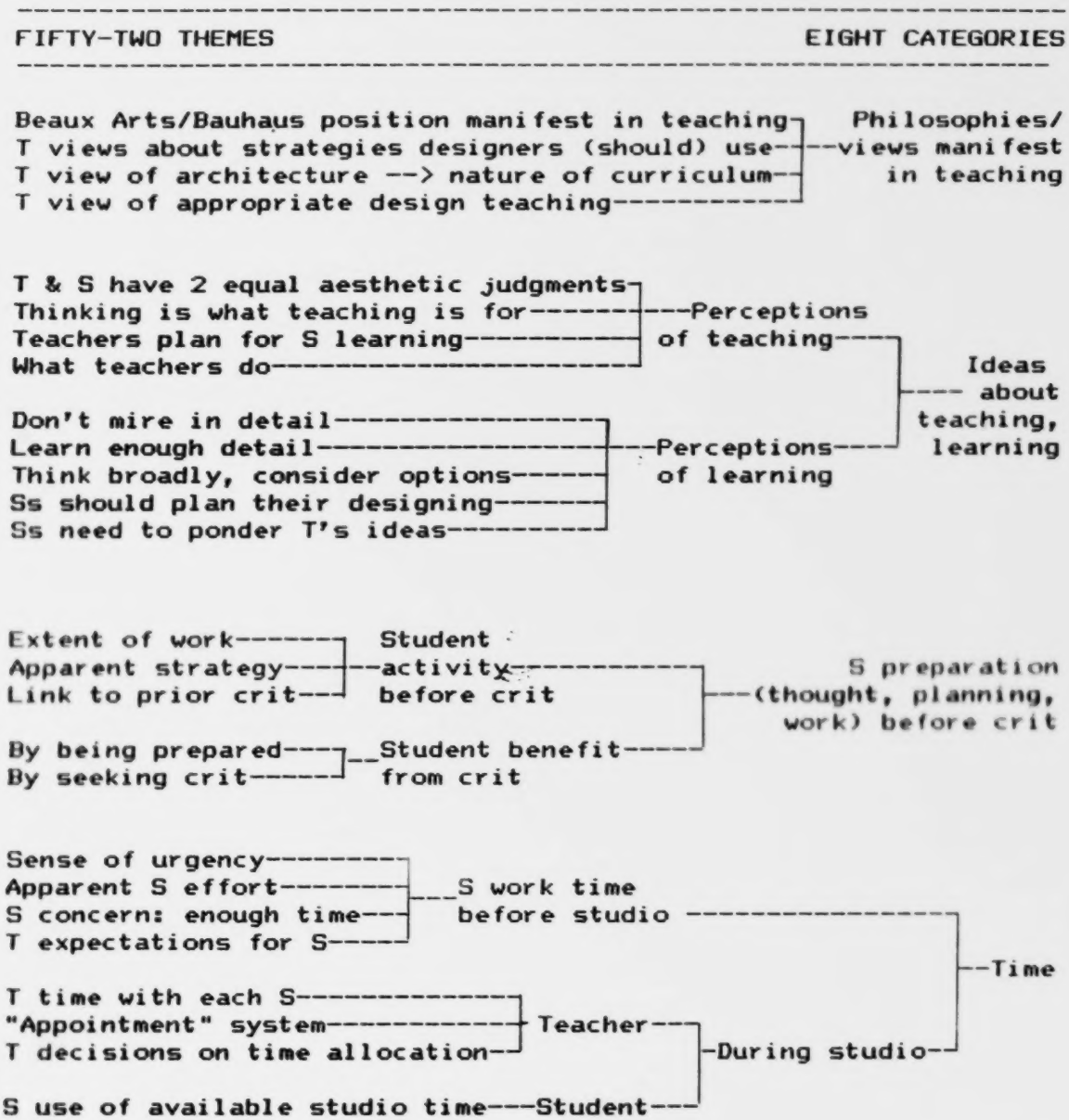

Four schools yield notes on studio teaching by 10 teachers
--->
Full data set = 761 elements
--->
Of which 99 relate to desk crits
--->
Evidence on 53 themes
Reduced to six categories
Illustrative elements for each category reviewed
--->
Two categories divided
Final result: eight categories concerning student-teacher exchanges in desk crits

Illustration E

Eight Categories of Findings on Architecture Studio Desk Crit Teaching*


FIFTY-TWO THEMES
EIGHT CATEGORIES
Beaux Arts/Bauhaus position manifest in teaching
T views about strategies designers (should) use
T view of architecture --> nature of curriculum
T view of appropriate design teaching
Philosophies/ views manifest in teaching
T & S have 2 equal aesthetic judgments
Thinking is what teaching is for
Teachers plan for S learning
What teachers do
Perceptions of teaching
Don't mire in detail
Learn enough detail
Think broadly, consider options
Ss should plan their designing
Ss need to ponder T's ideas
Perceptions of learning
Ideas about teaching, learning
Extent of work
Apparent strategy
Link to prior crit
Student activity before crit
By being prepared
By seeking crit
Student benefit from crit
S preparation (thought, planning, work) before crit
Sense of urgency
Apparent S effort
S concern: enough time
T expectations for S
S work time before studio
T time with each S
"Appointment" system
T decisions on time allocation
Teacher
S use of available studio time
Student
During studio
Time

* T=teacher; S=student

Illustration E, continued